PORTISHEAD

OS Grid Reference: ST461770

Highlights

The Woodhill Bay Fish Bed at Kilkenny Bay, Portishead, in Avon has yielded 12 species of fossil fishes, including the only British record of*Groenlandaspis*, a widespread form known otherwise from Ireland, Greenland, the Catskill Mountains, Pennsylvania, the Middle East, Australia and Antarctica.

Introduction

The Woodhill Bay Fish Bed was first described bySanders (1863), having been discovered by the Rev. B. Blenkiron from loose blocks on the foreshore. Fossil fish collections were reported by Bailey (1865), Gardiner (1894), Wallis (1928) and Ritchie (1975). Wallis (1928) gave a section and described the history of fossil collecting at Portishead, and Kellaway and Welch (1948, 1955, 1993), Pick (1964) and Williams and Hancock (1977) have provided accounts of the structure and sedimentology of the Portishead Beds. The cliff section presents a continuing opportunity for fossil collecting and local amateurs visit it periodically. Eurypterid remains have been recovered here and traces of plants occur as carbon smudges in some of the finer sandstones.

Description

The Portishead Beds between Westbury-on-Trym, Portishead and Clevedon consist of a number of isolated lenticular masses of pebbly beds, set in a sequence of red and green mudstones and marls, red siltstones, and red, yellow and pale grey fine-grained quartzose sandstones. Individual beds cannot be traced far laterally, and the whole succession is up to 300 m thick, of which 62 m are exposed in Kilkenny Bay. The beds dip gently to the south-east, and the sediments indicate a south-easterly direction of current flow.

Pick (1964) divided the Portishead Beds (Upper Old Red Sandstone) in Woodhill and Kilkenny Bays into nine units, which are separated from the Black Nore Sandstones (?Lower Old Red Sandstone) by an unconformity, and are overlaid unconformably by Triassic Dolomitic Conglomerate. At the base of the Portishead Beds is the Woodhill Bay Conglomerate, a 4–4.5 m thick unit of poorly sorted clasts of vein quartz, chert and red quartzite, which rests on an eroded surface on top of the Black Nore Sandstone (Figure 7.4).

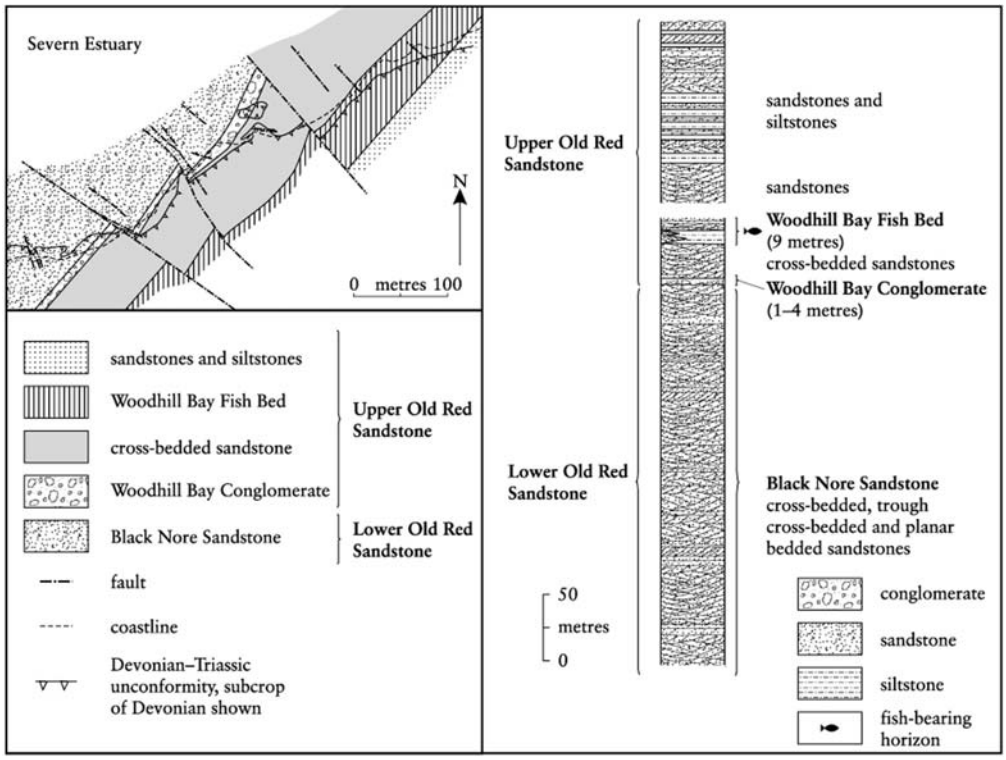

Figure 7.4: Sketch map and section through the Late Devonian near Portishead (after Pick, 1964).

The Woodhill Bay Fish Bed (Williams and Hancock, 1977) is unit F of Pick (1964), and represents Beds 5–10 of Wallis (1928). It is 10 m thick, and consists of red micaceous siltstones and quartzitic sandy siltstones with a few thin green siltstone beds. Sandstones become more common in the middle and upper part of the unit and there are four prominent fine-grained sandstone beds that can be traced across the outcrop. The pebbly sandstones rest on erosion surfaces cut into the finer-grained sandstones of this unit, showing evidence of channel deposits fining up into overbank or floodplain deposits. Figure7.4 is a representation of the Portishead Beds section at Woodhill Bay.

Fauna

Placodermi: Antiarchi: Asterolepidae

Asterolepis maxima Agassiz, 1844

Placodermi: Antiarchi: Bothriolepidae

Bothriolepis cf. *hydrophila* (Agassiz, 1844) Placodermi: Arthrodira: Phyllolepida

Phyllolepis concentrica Agassiz, 1844

Placodermi: Arthrodira: Phlyctaenaspidae

Groenlandaspis sp. [?*Groenlandaspis disjec- tus* Woodward, 1891]

Osteichthyes: Sarcopterygii: Porolepiformes: Holoptychidae

*Holoptychius giganteus*Agassiz, 1839 **H**. *nobilissimus*Agassiz, 1839

Osteichthyes: Sarcopterygii: Rhizodontidae

Glyptopomus kinnairdi (Woodward, 1859)

Sauripteris anglicus Woodward, 1891

Osteichthyes: Sarcopterygii: Dipterida

Conchodus sp.

Large *Holoptychius* scales are the most abundant fossils, together with scales of*Glyptopomus*, and teeth and scales of other species. In recent years much fragmentary*Bothriolepis* material has been recovered, but not studied. Its small size suggests that it may belong to juveniles. Wallis (1928) produced the following faunal list from the Woodhill Fish Bed:

Bed Number

Placodermi: Antiarchi

Asterolepis maxima Agassiz,

1844 7–8

Bothriolepis cf *hydrophila*

Agassiz, 1844 7–8, 10

Ceraspis sp. 7–8

Placodermi: Arthrodira

Coccosteus ?disjectus

(*Groenlandaspis*) 7–8

Phyllolepis concentrica Agassiz,

1844 7–8

Osteichthyes: Sarcopterygii

Conchodus sp. 7–8

Holoptychius nobilissimus

Agassiz,1839 7–8, 10, 18

H. giganteus 7–8, 10

Rhizodontids 7–8, 10

Sauripteris anglicus Woodward,

1891 7–8 *Glyptopomus kinnairdi* Huxley,

1859 7–8, 10, 18

Fossil fishes had been recognized and collected from this fish bed for many years (Figure7.5), but neither Pick (1964) nor Williams and Hancock (1977) distinguished the various fish horizons within this unit. Associated with the vertebrates are remains of the large arthropods, eurypterids. Three or four horizons in the Woodhill Bay Fish Bed have yielded fishes (Wallis, 1928, Beds 7 ‘Conglomeratic sandstone' 8 ‘Conglomeratic sandstone', and 10 ‘Brecciated siltstone'). Wallis (1928) also recorded fish fragments from his Bed 18, thinly bedded siltstones at the top of the cliff.

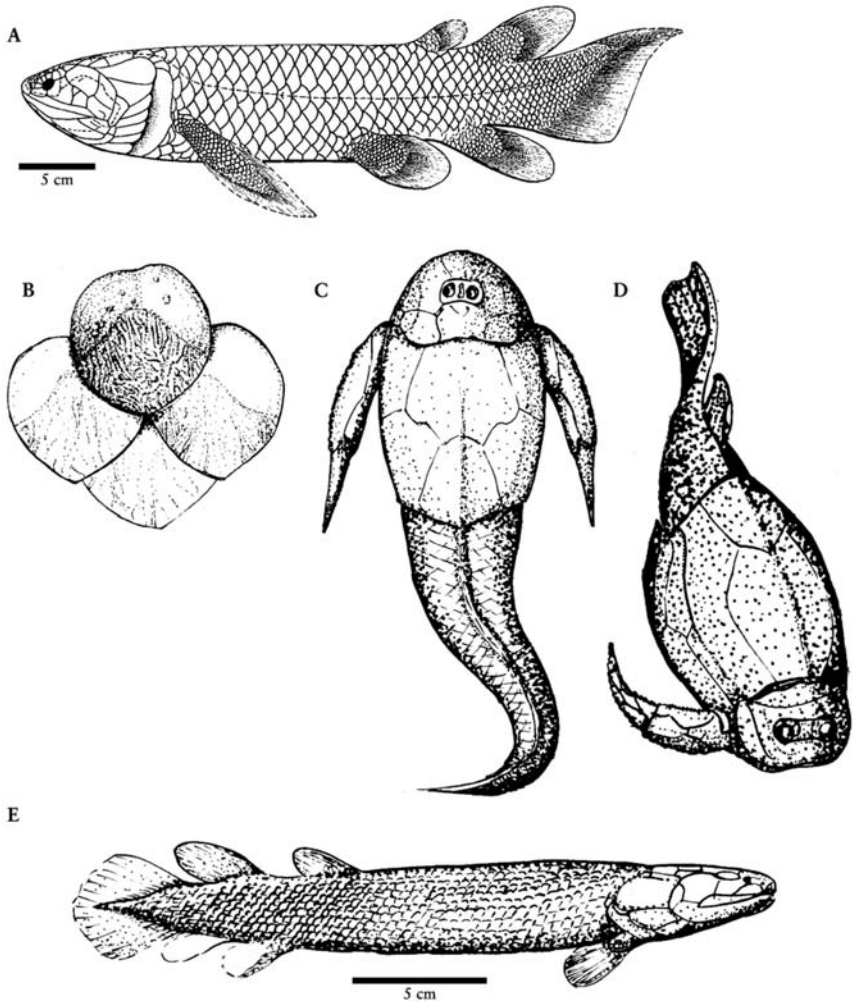

Figure 7.5: Fossil fishes from the Late Devonian of Woodhill Bay, near Portishead. (A) Reconstruction of the large porolepiform Holoptychius spp. (after Janvier, 1996); (B) Holoptychius scales, c. × 0.5; (C) Bothriolepis maxima Agassiz, restoration in dorsal view, c. × 0.5; (D) Asterolepis maxima Agassiz, × 0.3; (E) Glypopomus kinnairdi Woodward restoration after Jarvik.

Gardiner (1892) described fish remains, but he was unable to trace the bed to the cliff.Wallis (1928) examined the specimens to determine that they had come from his Bed 7.Bailey (1865) found fossils in the cliff in Bed 8. The Geology Section of the Bristol Naturalists' Society, visiting the section in 1867, produced the Martyn Collection in BRSMG, all from Bed 8 (Wallis, 1928). The first specimens came from Bed 10 on the foreshore (Bailey, 1864;Wallis, 1928).

A more recent record (Ritchie, 1975) from the Woodhill Bay Fish Bed is the arthrodire placoderm *Groenlandaspis* sp. (Figure 7.6), the only English record of this genus, which is known from the Middle Devonian of Australia (Long, 1983), the Upper Devonian of Ireland (Woodward, 1891a), Greenland, Australia and Antarctica (Denison, 1978), the Upper Devonian (Frasnian) of Turkey and Iran (Janvier and Ritchie, 1977), from the Upper Devonian or Lower Carboniferous of Ireland (Ritchie, 1975; Denison, 1978) and from the Upper Devonian of the Catskills in USA (T. Daeschler, pers. comm.). The latter occurrence has been dated as Mid-Famennian and if confirmed would predate the original East Greenland discovery of this genus (see below).

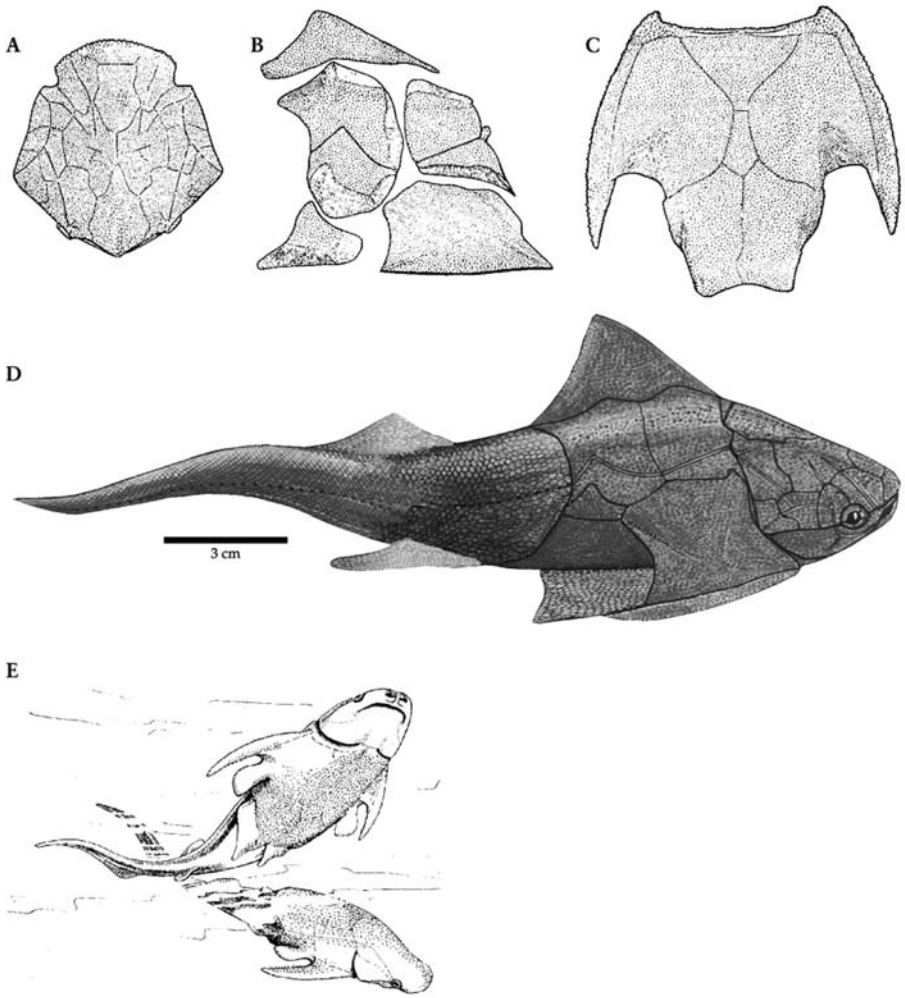

Figure 7.6: Groenlandaspis from Portishead and other localities. Reconstruction of Groenlandaspsis (taken with permission from J. Long, 1995), length of animal c. 25 cm. (A) Dorsal view of cranial roof plates; (B) plates of the trunk armour in lateral view; (C) trunk armour in ventral view (after Ritchie, 1974), (A)–(C) × 0.5; (D) reconstruction (after Long, 1995); (E) reconstruction of Groenlandaspsis showing ventral surface, by Ritchie (1971).

Groenlandaspis was first described from East Greenland (Heintz, 1930; Stensiö, 1934, 1939a), where it occurs above the zones of *Bothriolepis* and *Remigolepis*. This may indicate that it is, in fact, Early Carboniferous in age (Westoll, 1951). It is placed in the Family Holonematidae (Denison, 1978), which is characterized by a long trunk shield and long spinals. *Groenlandaspis* is typified by a median dorsal plate that is elevated into a median crest. *Groenlandaspis* may be the last member of the Suborder Phlyctaeniina that is known from the Early and Mid-Devonian, and is the only Late Devonian member (Young, 1974). Gardiner (1993a) assigns the Family Groenlandaspididae to a separate 'suborder', the Groenlandaspids, and notes the Portishead specimen as equal in age to other last occurrences from beds of the same age in Greenland, Ireland (Kiltorcan Beds, Co. Kilkenny), Antarctica and Australia.

Within the last two decades further bones and teeth of sarcopterygians have been recovered, some of very large size. No other taxa have been reported in recent years.

Interpretation

The Upper Old Red Sandstone of the Anglo-Welsh Basin has its provenance in North Wales or beyond. Wallis (1928) believed that the pebbles in the Woodhill Bay Conglomerate were derived from the Precambrian Mona Complex of Anglesey. Transport southwards was fluvial and vigorous. Sedimentological features suggest that the sediments accumulated in wide alluvial plains with continual reworking of the sediments. Pedocal limestones above and below the Lower–Upper Old Red Sandstone unconformity were deposited during periods of

emergence in humid tropical environments. The fish fauna includes a majority of large predatory species; their prey was presumably largely of invertebrates. No other such fossil fish community is known from southern Britain, though the Scottish Late Devonian faunas, e.g. Hawks Heugh (q.v.), may have been similar.

The Woodhill Bay fish species have been used to help to date the Old Red Sandstone beds of the Bristol Channel area. The find of *Coccosteus* links the Woodhill Bay Fish Bed with the Bittadon Tuff at the base of the Pickwell Down Sandstone of Mill Rock (q.v.), according to Kellaway and Welch (1993), and hence suggests a Mid-Famennian age. The topmost part of the Portishead Beds have been dated as low Tournaisian on the basis of spores (Neves and Dolby, 1967; Dolby and Neves, 1970), at a point where they pass into the Lower Limestone Shales of the Carboniferous. The presence of *Groenlandaspis* indicates that migration routes were open between this region and other parts of Laurussia as well as Gondwanaland.

No other locality in the Bristol area has yielded later Devonian vertebrates on the scale of the Portishead occurrence. Reports of vertebrate fragments have not been numerous, despite frequent searches in the field (Martyn, 1875; Kellaway and Welch, 1993).

Conclusions

The fishes reported from the Woodhill Bay Fish Bed indicate a rather diverse fauna, which is unique in southern Britain and gives the site its conservation value. The fauna contains some unusual elements, in particular *Groenlandaspis*, a placoderm not otherwise known in Britain. The continuing coastal erosion of the fish bed means that more specimens may be found in future.

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